Summary of Upcoming Improvements to AWIPS/IFPS Model Data

26 February 2004

Statement of Need

- A more complete set of model data is needed for optimal use in the IFPS/GFE
  - Native resolution and adequate vertical information needed for use in IFPS and GFE Smart Init, both for short and medium range forecast grids
- Requirements originally established during May 2003 WR SOO/DOH IFPS Workshop
  - Adopted by NWS IFPS Science Steering Team (ISST) and forwarded to Science the Technology Committee of NWS Corporate Board (May 27, 2003)

Outline of Model Data on the Way

- Data sets resulting from May 2003 WR SOO/DOH workshop recommendations
  - Eta12 surface data through 84 hrs, 4 times/day (see slide 4 on RC #AB666)
  - Additional GFS vertical data to 240 hrs (168 hours on 06 and 18Z cycles) (see slide 5 on RC #AB665)
- Proposed ISST solution to downscaling medium range model data for GFE
  - Downscaled GFS with Eta Extension (DGEX)
- Previous requirements in place
  - Full Eta12 through 84 hrs (OB3.2 implementation goal)
  - Additional (full) GFS fields (OB4, at the earliest)

Additional Eta12 Data (RC #AB666)

- Surface data extended through full 84 hrs
  - Added 63, 66, 69, 72, 75, 78, 81, and 84 Hrs.
  - 0-84 hrs available from 00, 06, 12 & 18 Z cycles
- Started arriving in AWIPS on 18 February 2004 with 18Z run
- Monitoring additional communications load

Additional GFS Vertical Data (RC #AB665)

- Additional levels at 80 km through 240 hrs (168 hrs on 06 and 18Z cycles)
  - Z, T, u, v, and RH for Sfc, BL (0-30,30-60,60-90,90-120,120-150,150-180 mb AGL), 1000-500 x 25 mb, 500-100 x 50 mb
  - CAPE and CIN (surface- and 0-180 mb AGL-based)
- Status (2/24/04)
  - Concern with additional load on Telecommunications Operations Center (TOC) legacy mainframe
  - Continued migration from mainframe should allow for fewer interruptions over time
    - Move data around mainframe; thus, data may arrive out of forecast sequence (deemed acceptable)
  - Target AWIPS implementation date: No earlier than OB3.2 (Spring 2004)
    - Need to start data flow first in order to test AWIPS upgrade software

Downscaled GFS with Eta eXtension (DGEX)

- Background
  - Designed to bring quick relief to forecasters by giving physically consistent and seamless option for high resolution medium range forecast grids
- Summary of Model Run Design
  - Run Eta12 out to 192 hr on smaller domain using GFS lateral boundary conditions (LBC)
    - Analogous to downscaling GFS since GFS synoptic scale should dominate Eta solution within the small interior domain
    - Start DGEX at 78 hr to allow for adjustment to smaller grid by 84 hr (first time available)
    - 78-174 hr uses 3-hr GFS LBC; 174-192 hr uses 6-hr GFS LBC

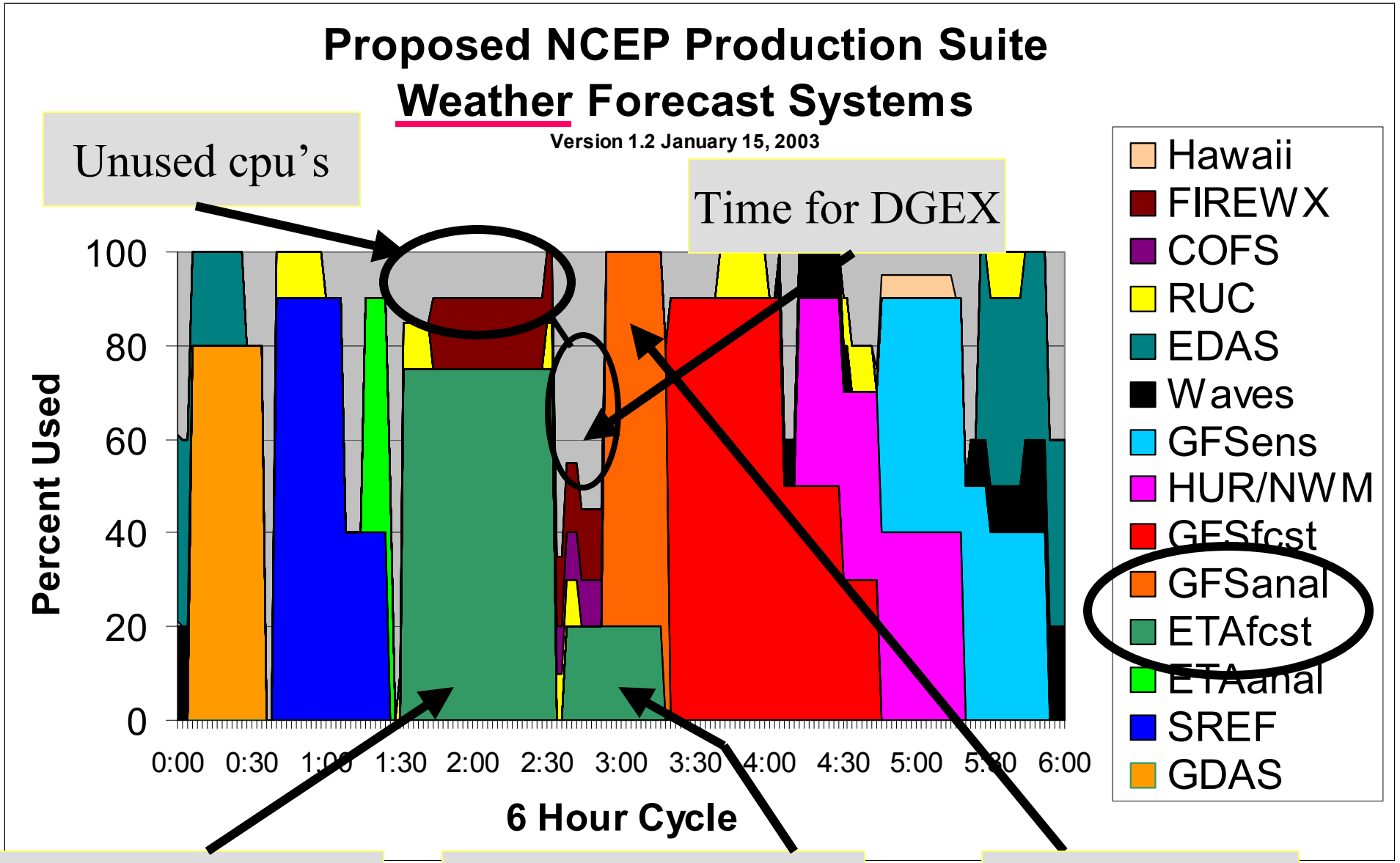
DGEX – Run Time Details

- Cycle times – run twice per day per grid
  - 06 and 18Z (00 and 12Z GFS LBC) for CONUS
    - Available ~10-12Z (06Z run) and ~20-0Z (18Z run)
  - 12 and 00Z (06 and 18Z GFS LBC) for OCONUS
  - Accommodates 18Z, day 8 grids timeliness deadline
    - Available ~4-6Z (00Z run) and ~16-18Z (12Z run)
- First Development Phase
  - Extend current 0-60 hr off-hour Eta out to 84 hr, freeing up current 60-84 hr Eta time slot for DGEX (April 2004)
- Initial Evaluation Phase (March-April 2004)
  - Single run per day off 00Z cycle for CONUS & AR
  - Run off EMC's 00Z parallel experimental Eta

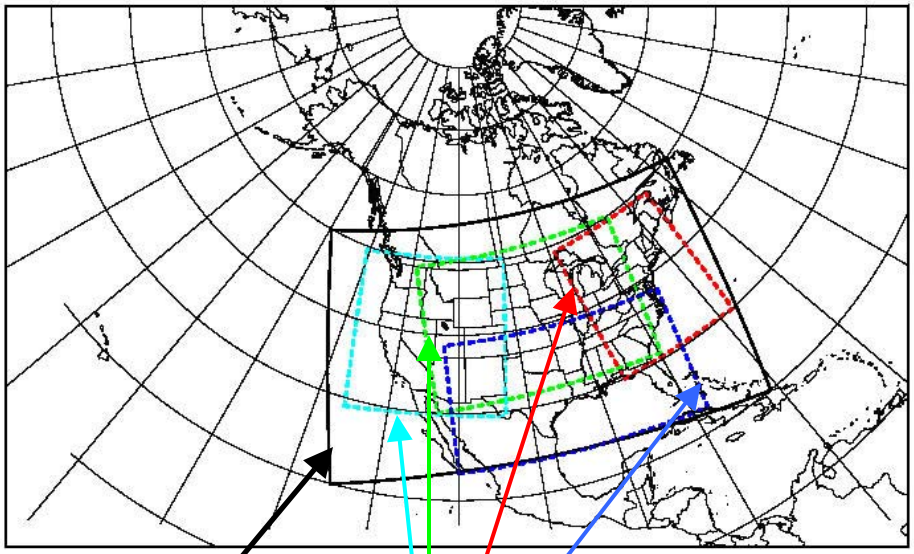
DGEX – Parameters

- Pressure at surface and MSL
- T and RH at 2 meter, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- U and V wind at 10m, 0-30mb, 30-60mb, 60-90mb, 90-120mb, 120-150mb
- Total Precip at surface
- Total Cloud Cover
- Max/Min temperature at 2 meter
- Weather Smart Init fields
  - Probability of Freezing Precip
  - Probability of Frozen Precip
  - Probability of Thunderstorms
- Terrain height (only once - not every time-step)
- Synoptic parameters (for assessment of model synoptics):
  - Sea Level Pressure
  - 1000 mb Z
  - 850, 700, 500 mb Z, T, RH, U, V
  - 700 mb omega
  - 250 mb Z, U, V
  - Surface based lifted index

Wx Production Suite Made Up of Four Uniform Cycles per Day



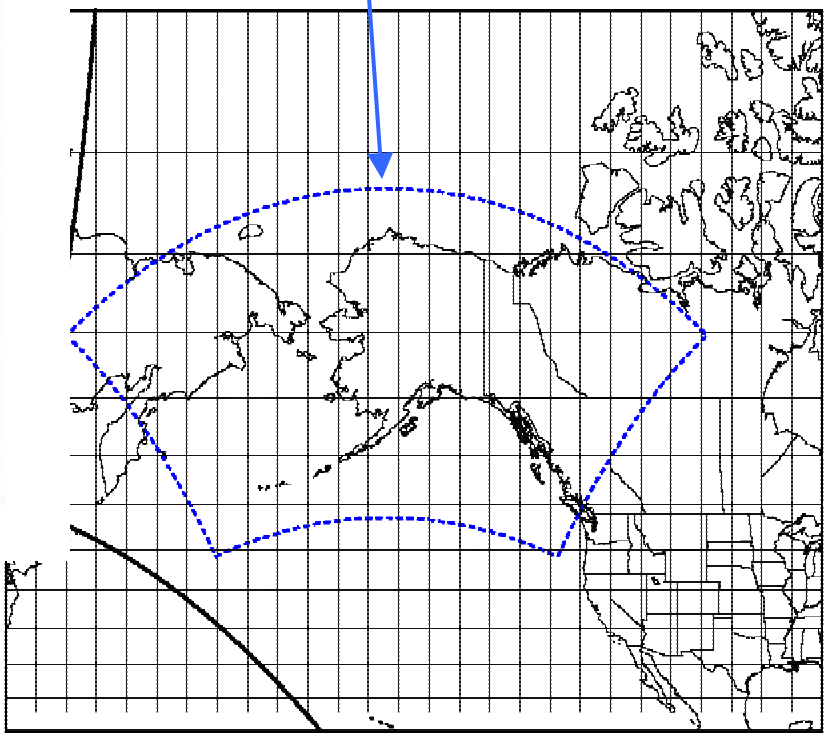
DGEX – Domains



CONUS Domain

Regional Distribution Tiles

Alaska Region Domain



Regional subsets only used during evaluation period when folks are getting files via ftp.

Final distribution will be on grid #218 with GRIB2 compression via new AWIPS SBN.

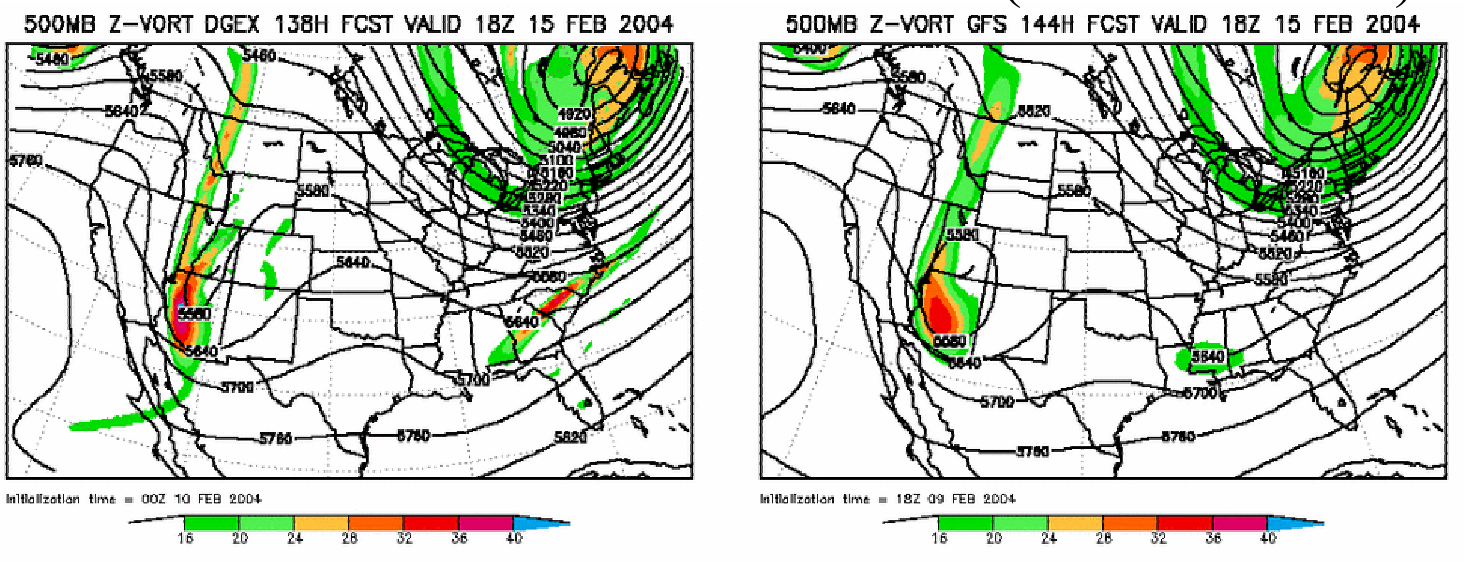
Will DGEX drift from GFS?

DGEX vs. GFS LBC run

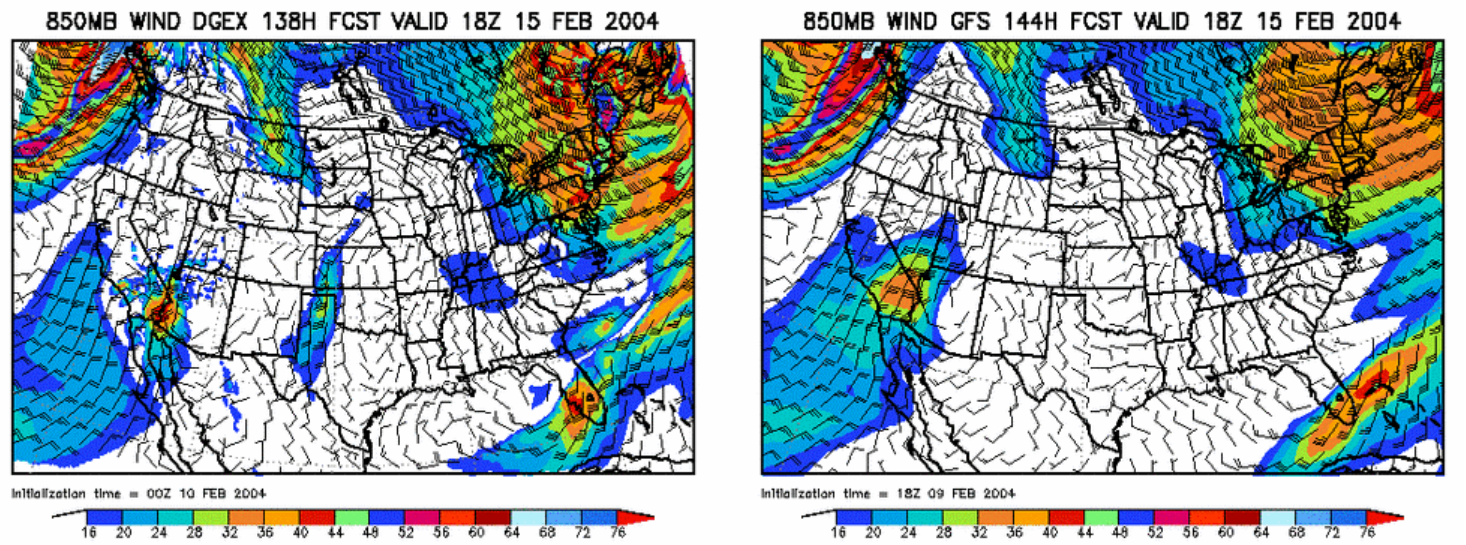
0Z DGEX

18Z GFS (used for LBCs)

500 mb ht/vort



850 mb wind



DGEX – Initial Steps

- Change Notification proceeding (consolidation of Eta run results in earlier delivery of current 0-84hr Eta)
- Test DGEX grids available to setup optimal baseline SmartInit
- EMC webpage comparing test run results

  http://wwwt.emc.ncep.noaa.gov/mmb/mmbpll/etapll8day/

  http://wwwt.emc.ncep.noaa.gov/mmb/mmbpll/etapll8day.ak/
- March 15 – April 15: testing and evaluation period
  - Regional WAN distribution method will be used for evaluation (facilitated by WR-SSD); although SBN solution will be used when fully operational
  - Forecasters at a subset of WFOs to assess impact on operations
  - Evaluate internal drift issues
  - Evaluate use in GFE and impact on WFO boundary discrepancies
  - HPC will perform model diagnostics

DGEX – SBN/AWIPS Timeline

- Mid April: convergence of Eta runs complete and DGEX running operationally
  - GRIB1 Regional distribution continues
- Late May: DVB-S efforts free up SBN bandwidth
- June: OB3.2 upgrade to AWIPS configuration
- June: DGEX operational via SBN using GRIB2
- Will eventually be replaced by more permanent downscaling solution(s)

- Note: Pacific Region and Puerto Rico DGEX runs are planned, but details still need to be worked out (will not be included in evaluation phase)

Full Eta12 and GFS

- Will allow more complete use of Eta and GFS in AWIPS and GFE
- Goal is to have full Eta12 (0-84 hrs, 4x/day) in AWIPS OB3.2 (late May or early June), and no later than OB4 (September)
  - Turn off MesoEta 40 km; retain Eta 80-km data
- Full GFS RC adds additional fields to RC AB665
  - 0-240 hrs, 4x/day (likely only to 168 hrs on 06 and 18z runs)
  - No earlier than OB4

Other Model Efforts in Place

- MREF (84-240 hr)
  - Planned implementation in AWIPS OB5
  - 6 months-post OB4 (approx. Spring 2005)
- GFS BUFR soundings